Fact Sheet

April 2005

California Environmental Protection Agency
Air Resources Board

Review of the California Ambient Air Quality Standard for Ozone

1. What are the health and welfare effects of ozone?

Ozone, an important ingredient of smog, is a highly reactive and unstable gas capable of damaging the linings of the respiratory tract. This pollutant forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, and many other sources. Inhalation of ozone can result in a number of adverse health effects. The most typical responses include reduction in various measures of lung function and increased symptoms of respiratory irritation, such as cough, wheeze, and pain on inhalation. Ozone can also increase airway hyperreactivity and airway inflammation. These effects can lead to reduced work or exercise capacity, and if repeated frequently, permanent changes in the structure of the lung tissues. In addition, ozone exposure has been linked to emergency room visits for asthma, hospital admissions for respiratory disease, school absenteeism, restricted activity days, and premature death. The most affected groups include those who work outdoors, those who exercise heavily, and children. Asthmatics may also represent a sensitive sub-population for ozone health effects. Ozone also has adverse effects on vegetation and agricultural crops, and is a cause of economic loss to the agricultural industry.

2. Why does the Air Resources Board review ambient air quality standards?

The California Health and Safety Code [section 39606] authorizes the Air Resources Board (ARB) to adopt standards for ambient air quality “in consideration of public health, safety, and welfare, including, but not limited to, health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy.”

In 1999, the California Legislature adopted the Children's Environmental Health Protection Act (Senate Bill 25, Escutia) which established specific requirements to determine if children are adequately protected from the harmful effects of air pollution. The Air Resources Board (ARB), in consultation with the Office of Environmental Health Hazard Assessment (OEHHA), was required to review all health-based California ambient air quality standards and determine whether they adequately protect public health, including infants and children. In December 2000, the ARB approved a report on the adequacy of California’s air quality standards, which found that the standards for particulate matter (including sulfates), ozone, and nitrogen dioxide may not be sufficiently protective and should undergo full review and possible revision. The particulate matter standard was reviewed and revised in 2002. The ozone standard is currently under review.

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3. What are the elements of an ambient air quality standard?

Ambient air quality standards represent the legal definition of clean air. They specify the maximum concentration for a specified duration of exposure that is unlikely to induce adverse effects (Health and Safety Code section 39014).

The elements of an ambient air quality standard in California include:
- Definition of the pollutant
- A concentration
- An averaging time
- A monitoring method to determine attainment

4. What is the basis of ambient air quality standards?

In California, ambient air quality standards are based solely on health and welfare considerations. Standard reviews include evaluation of the most recent scientific literature on controlled human and animal exposure data, and epidemiological studies of population effects. The reviews specifically evaluate the effects of air pollution on infants, children, and other potentially sensitive subgroups of the population in addition to healthy people. The result is the establishment of air quality standards which protect public health, including infants and children, with an adequate margin of safety.

5. What is the process for setting ambient air quality standards in California?

Setting ambient air quality standards in California is a regulatory action promulgated according to the rulemaking process outlined in the California Administrative Procedure Act. The process requires preparation of a draft staff report, following a staff review of the scientific literature. The report includes a recommendation for the standard under review, which is developed by the OEHHA. The draft staff report is then released for public comment. During the comment period, ARB staff present the recommendations at public workshops, at which the public and stakeholders can comment on the proposed recommendation. Next, the Air Quality Advisory Committee (AQAC), which is appointed by the Office of the President of the University of California, holds a public peer review of the draft staff report, recommendations, and the basis of those recommendations. Staff then revises the report to address the recommendations of AQAC, and then releases the final report. At the same time, a notice of proposed rulemaking is published. Publication of the notice of proposed rulemaking opens an official 45-day public comment period, at the end of which the Air Resources Board considers the proposed standard at a public hearing. After approval of the recommendation by the Board and the regulatory record by the Office of Administrative Law, the revised standard is filed with the Secretary of State, and it becomes effective in 30 days.

6. How does this process differ from that of the U.S. Environmental Protection Agency (U.S. EPA)?

The process followed by U.S. EPA begins with publication of a criteria document (CD) that includes an extensive review of the relevant literature on the pollutant being evaluated. The CD does not include recommendations. The CD is peer reviewed by the Clean Air Scientific Advisory Board (CASAC). A different division of U.S. EPA develops a Staff Report that summarizes the conclusions derived from the CD, and proposes a range including several possible standards. This is released for public review, and is also peer reviewed by CASAC. Both the CD and Staff Paper undergo several iterations of revision followed by peer review by CASAC until CASAC accepts them as closed. At this point the Staff Paper goes to the U.S. EPA Administrator who selects the standard from the range of values suggested in the Staff Paper. In contrast to U.S. EPA's process, California State law requires only one staff report that contains both the scientific review and the recommendations for the standard under review. Moreover, the recommendations in the California staff report are for specific values, not a range, which are based solely on health and welfare considerations.

7. How can U.S. EPA and California review the same scientific literature and come to different conclusions as to an appropriate standard?

According to California law, ambient air quality standards represent the highest concentrations for selected averaging times that are unlikely to induce adverse effects and include a margin of safety. As required by State law, California ambient air quality standards are based solely on health and welfare considerations. In addition, California law requires that ambient air quality standards protect the most sensitive subgroup of the population. This means that we must evaluate not only average group responses, but also the range of individual responses, so as to understand the variability in the population as a whole. In addition, the Children's Environmental Health Protection Act requires the ARB to establish standards that adequately protect the public, including infants and children, from the harmful effects of air pollution.

In contrast, U.S. EPA primarily evaluates air pollution induced health effects at the group average level, with less consideration of the variability between individuals. The U.S. EPA Administrator also considers the results of an analysis of the number of people likely to experience exposure to the various concentration/averaging times proposed for consideration as part of selecting the standard.

8. What are the new recommendations for the ozone standard?

- Establish a new 8-hour-average standard at **0.070 ppm**, **not to be exceeded.**
- Retain the current 1-hour-average standard at **0.09 ppm, not to be exceeded**.
- Retain the current monitoring method using ultraviolet (UV) photometry.

9. Are these new standards above background concentrations?

Yes, the new standards are above background concentrations for ozone. Background ozone at the Earth's surface is the product of photochemical reactions of natural precursors in the troposphere, combined with ozone transported downward from the stratosphere. Limited data from pre-industrial times and recent model calculations indicate that average natural background ozone near sea level is in the range of 0.015 to 0.035 ppm, with a maximum of about 0.040 ppm.

10. What are the implications for attainment of the standards?

The standard review in California does not include establishment of criteria for designating the attainment status of areas. This is done through a separate regulatory process. Both the ARB and U.S. EPA designate areas based on recent ambient air quality data, which must meet specific siting and quality assurance procedures established by the ARB and U.S. EPA. The State area designation process has several provisions for excluding high values that are not reasonable to control through the regulatory process, which are categorized as extreme concentration events, exceptional events, and unusual concentration events. Examples include stratospheric ozone intrusion for exceptional events and adverse meteorology triggering an extreme concentration event.

The standard review in California also does not establish deadlines for attainment. Rather, the California Clean Air Act requires that districts achieve the standard as expeditiously as possible by employing all feasible measures of air pollution control.

11. What are the health impacts of the new ozone standards?

Since the 1970's, ambient ozone levels have decreased markedly in many areas of California, resulting in significant health benefits. In the South Coast Air Basin we estimate that ozone reductions from 1980 to 2000 resulted in (for 2000 alone) about 1000 deaths prevented, 6,000 fewer hospital admissions, over 10 million fewer school absences, and about 5 million fewer minor restricted activity days for adults. The new standards will continue this record of public health protection. Compared to today's ozone levels, statewide attainment of the new standards would prevent annually about 580 premature deaths (range of 290 – 870), 3,800 (2,200 – 5,400) hospital admissions due to respiratory diseases for all ages, 3.3 million (0.4 – 6.1 million) school absences, and 2.8 million (1.2– 4.6 million) minor restrictive days for adults.

For more information on Ambient Air Quality Standards, please contact the ARB's Public Information Office at (916) 322-2990, or our web site at: http://www.arb.ca.gov/research/aaqs/aaqs.htm